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| Sixth Grade Science 2010-2011  Standards Overview | |
| Physical Science | 1. All matter is made of atoms, which are far too small to see directly through a light microscope. Elements have unique atoms and thus, unique properties. Atoms themselves are made of even smaller particles.  2. Atoms may stick together in well-defined molecules or be packed together in large arrangements. Different arrangements of atoms into groups compose all substances.  3. The physical characteristics and changes of solid, liquid, and gas states can be explained using the particulate model.  4. Distinguish among, explain, and apply the relationships among mass, weight, volume, and density. |
| Life Science | 1. Changes in environmental conditions can affect the survival of individual organisms, populations, and entire species.  2. Organisms interact with each other and their environment in various ways that create a flow of energy and cycling of matter in an ecosystem. |
| Earth Science | 1. Complex interrelationships exist between Earth’s structure and natural processes that over time are both constructive and destructive.  2. Water on Earth is distributed and circulated through oceans, glaciers, rivers, ground water, and the atmosphere.  3. Earth’s natural resources provide the foundation for human society’s physical needs. Many natural resources are nonrenewable on human timescales, while others can be renewed or recycled. |

**1st Quarter 6th grade 2010-2011**

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| Concepts and skills students master:   * 3. The physical characteristics and changes of solid, liquid, and gas states can be explained using the particulate model | |
| Evidence Outcomes  Students can: | **21st Century Skills and Readiness Competencies** |
| a. Explain how the arrangement and motion of particles in a substance such as water determine its state  b. Distinguish between changes in temperature and changes of state using the particle model of matter | **Inquiry Questions:**  1. What determines whether matter is in the form of a solid, liquid, or gas?  2. What is the kinetic molecular theory, and how does temperature affect the behavior of particles in a gas? |
| **Relevance and Application:**   1. Solids, liquids, and gasses all have unique properties that make them useful in different situations. For example, solids are useful building materials. |
| **Nature of Science:**   1. Use models and technology tools to help visualize what is happening at the molecular level during phase changes. 2. Understand and apply the difference between scientific laws, theories and hypotheses. 3. Work in groups using the writing process to communicate an understanding how the particle model of matter explains various states of matter. |

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| Concepts and skills students master:   * 4. Distinguish among, explain, and apply the relationships among mass, weight, volume, and density | |
| Evidence Outcomes  Students can: | **21st Century Skills and Readiness Competencies** |
| a. Explain that the mass of an object does not change, but its weight changes based on the gravitational forces acting upon it  b. Predict how changes in acceleration due to gravity will affect the mass and weight of an object  c. Predict how mass, weight, and volume affect density  d. Measure mass and volume, and use these quantities to calculate density  e. Use tools to gather, view, analyze, and report results for scientific investigations about the relationships among mass, weight, volume, and density | **Inquiry Questions:**   1. Which of the following is the best recommendation for a person trying to lose weight and why?    * Reduce the number of calories he or she eats.    * Exercise more.    * Go to the Moon. 2. If weight and mass are not the same thing, why might people use the words interchangeably? 3. Describe a situation in which mass would be the most useful information to know about an object? Do the same for weight, volume, and density. |
| **Relevance and Application:**   1. Mass, weight, and gravitational forces are critical for space travel, future visits to outer space, and possibly the colonization of places like the Moon or Mars. |
| **Nature of Science:**   1. Calculate the density of a sample, predict its ability to float or sink in a liquid of known density, design and perform the experiment, and justify discrepancies in the experimental outcome. 2. Ask testable questions and make a falsifiable hypothesis about density and design an inquiry based method to find an answer. 3. Select proper tools to measure the mass and volume of an object and use appropriate units. |

Plus: Nature and History of Science, Safety, Scientific Process (2 weeks and reinforced throughout)**2nd Quarter 6th grade 2010-2011**

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| Concepts and skills students master:   * 1. All matter is made of atoms, which are far too small to see directly through a light microscope. Elements have unique atoms and thus, unique properties. Atoms themselves are made of even smaller particles | |
| Evidence Outcomes  Students can: | **21st Century Skills and Readiness Competencies** |
| a. Identify evidence that suggests there is a fundamental building block of matter  b. Use the particle model of matter to illustrate characteristics of different substances  c. Develop an evidence based scientific explanation of the atomic model as the foundation for all chemistry  d. Find and evaluate appropriate information from reference books, journals, magazines, online references, and databases to compare and contrast historical explanations for the nature of matter | **Inquiry Questions:**   1. In the world of science what makes something a building block? |
| **Relevance and Application:**   1. Living things consist of the same matter as the rest of the universe. |
| **Nature of Science:**   1. Work in groups using the writing process to effectively communicate an understanding of the particle model of matter. 2. Use technology to share research findings about historical explanations for the nature of matter and to publish information to various audiences. 3. Create models that explain the particle theory of matter. 4. Recognize and describe the ethical traditions of science: value peer review, truthful reporting of methods and outcomes, making work public, and sharing a lens of professional skepticism when reviewing others work. |

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| Concepts and skills students master:   * 2. Atoms may stick together in well-defined molecules or be packed together in large arrays. Different arrangements of atoms into groups compose all substances | |
| Evidence Outcomes  Students can: | **21st Century Skills and Readiness Competencies** |
| 1. Explain the similarities and differences between elements and compounds 2. Identify evidence suggesting that atoms form into molecules with different properties than their components 3. Find and evaluate information from a variety of resources about molecules | **Inquiry Questions:**   1. Why do substances behave differently? For example, why does water pour rapidly while syrup pours slowly? |
| **Relevance and Application:**   1. Different arrangements of atoms provide different properties. 2. Very small devices consist of large numbers of arranged groups of atoms that perform a specific function. |
| **Nature of Science:**   1. Use models and/or electronic media to show and understand how molecules are made of atoms. 2. Investigate how our current understanding of matter has developed through centuries of scientific investigations. |

**3rd Quarter 6th grade 2010-2011**

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| Concepts and skills students master:   * 2. Water on Earth is distributed and circulated through oceans, glaciers, rivers, ground water, and the atmosphere | |
| Evidence Outcomes  Students can: | **21st Century Skills and Readiness Competencies** |
| 1. Gather and analyze data from a variety of print resources and investigations to account for local and world-wide water circulation and distribution patterns 2. Use evidence to model how water is transferred throughout the earth 3. Identify problems, and propose solutions related to water quality, circulation, and distribution – both locally and worldwide 4. Identify the various causes and effects of water pollution in local and world water distributions 5. Describe where water goes after it is used in houses or buildings | **Inquiry Questions:**   1. How is water cycled on Earth? 2. How does the lack or abundance of water impact human civilizations and populations? 3. How do your daily decisions impact the quality of water in the water cycle? |
| **Relevance and Application:**   1. Home water quality and consumption affects for health and conservation policies. 2. Water systems affect local, regional, and world population development. 3. Water-use irrigation patterns in Colorado affect economic development in the state. |
| **Nature of Science:**   1. Ask testable questions and make falsifiable hypotheses research about water distribution. 2. Create and evaluate models; identifying the strengths and weaknesses of the model in representing water circulation and distribution. |

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| Concepts and skills students master:   * 3. Earth’s natural resources provide the foundation for human society’s physical needs. Many natural resources are nonrenewable on human timescales, while others can be renewed or recycled | |
| Evidence Outcomes  Students can: | **21st Century Skills and Readiness Competencies** |
| 1. Research and evaluate data and information to learn about the types and availability of various natural resources, and use this knowledge to make evidence-based decisions 2. Identify and evaluate types and availability of renewable and nonrenewable resources 3. Use direct and indirect evidence to determine the types of resources and their applications used in communities 4. Research and critically evaluate data and information about the advantages and disadvantages of using fossil fuels and alternative energy sources | **Inquiry Questions:**   1. What resources are found and used in our community? 2. How can natural resources be identified and classified? 3. How can we make responsible choices about the resources we use on a daily basis? |
| **Relevance and Application:**   1. Natural resources come from a variety of locations and have to be mined or harvested, depending on the type. 2. A resource can be used in a variety of ways, depending on the product being made. For example plastics, textiles, medications, and fertilizers are produced from petroleum. 3. Resources in Colorado directly affect the state economy and society by providing employment and sources of revenue. |
| **Nature of Science:**   1. Recognize and describe the ethical traditions of science: value peer review; truthful reporting of methods and outcomes; making work public; and sharing a lens of professional skepticism when reviewing the work of others. |
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**3rd Quarter 6th grade 2010-2011**

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| Concepts and skills students master:   * 1. Complex interrelationships exist between Earth’s structure and natural processes that over time are both constructive and destructive | |
| Evidence Outcomes  Students can: | **21st Century Skills and Readiness Competencies** |
| a. Gather, analyze, and communicate an evidence-based explanation for the complex interaction between Earth’s constructive and destructive forces  b. Gather, analyze and communicate evidence form text and other sources that explains the formation of Earth’s surface features  c. Use a computer simulation for Earth’s changing crust | **Inquiry Questions:**   1. How do forces inside Earth and on the surface build, destroy, and change Earth’s crust? 2. How does Earth's surface change over time? |
| **Relevance and Application:**   1. There are costs and benefits to building in areas that are prone to constructive and destructive forces such as earthquakes and landslides. 2. Harbors, glaciers, and geysers change over time based on geologic and natural events. |
| **Nature of Science:**   1. Practice the collaborative inquiry process that scientists use to identify local evidence of Earth’s constructive and destructive processes. 2. Create and compare models that show how natural processes affect Earth’s structures. |

**4th Quarter 6th grade 2010-2011**

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| Concepts and skills students master:   * 1. Changes in environmental conditions can affect the survival of individual organisms, populations, and entire species | |
| Evidence Outcomes  Students can: | **21st Century Skills and Readiness Competencies** |
| 1. Interpret and analyze data about changes in environmental conditions – such as climate change – and populations that support a claim describing why a specific population might be increasing or decreasing 2. Develop, communicate, and justify an evidence-based explanation about how ecosystems interact with and impact the global environment 3. Model equilibrium in an ecosystem, including basic inputs and outputs, to predict how a change to that ecosystem such as climate change might impact the organisms, populations, and species within it such as the removal of a top predator or introduction of a new species 4. Examine, evaluate, question, and ethically use information from a variety of sources and media to investigate how environmental conditions affect the survival of individual organisms | **Inquiry Questions:**   1. How do ecosystem changes affect biodiversity? 2. How does biodiversity contribute to an ecosystem’s equilibrium? |
| **Relevance and Application:**  The development and application of technologies intended to aid some populations and ecosystems. |
| **Nature of Science:**   1. Ask testable questions and make a falsifiable hypothesis about how environmental conditions affect organisms, populations, or entire species and design a method to find the answer. 2. Recognize and describe the ethical traditions of science: value peer review; truthful reporting of methods and outcomes; making work public; and sharing a lens of professional skepticism when reviewing the work of others. 3. Use models and technology tools to show what might happen to individuals, populations, and species as environmental conditions change. |

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| Concepts and skills students master:   * 2. Organisms interact with each other and their environment in various ways that create a flow of energy and cycling of matter in an ecosystem | |
| Evidence Outcomes  Students can: | **21st Century Skills and Readiness Competencies** |
| 1. Develop, communicate, and justify an evidence-based explanation about why there generally are more producers than consumers in an ecosystem 2. Design a food web diagram to show the flow of energy through an ecosystem 3. Compare and contrast the flow of energy with the cycling of matter in ecosystems | **Inquiry Questions:**   1. How do different ecosystems cycle matter differently? 2. What “jobs” do organisms do to facilitate the flow of energy and cycling of matter? |
| **Relevance and Application:**   1. Humans use an understanding of the cycling of matter and energy to help mitigate environmental problems. For example, they treat waste water and clean up oil spills. |
| **Nature of Science:**   1. Scientists work from the assumption that the universe is a single system in which the basic rules are the same everywhere – that energy follows the same rules in an ecosystem as it does in physic’s experiments. 2. Generate solutions to help mitigate environmental problems based on an understanding of the cycling of matter and energy. 3. Create and evaluate models that show how interactions create a flow of energy and a cycling of matter in an ecosystem. |

Plus: Classification of plants and animals (1 week) & Health  (2 weeks)